

Determining the Effective Substance of Cottonseed Extract on the Treatment of Leishmaniasis

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Abstract : Gossypol, a yellowish anti-nutritional compound found in cotton plants, exists in various plant parts, including seeds, husks, leaves, and stems. Chemically, gossypol is a potent polyphenolic aldehyde with antioxidant and therapeutic properties. However, its free form can be toxic, posing risks to both humans and animals. Initially, we extracted gossypol from cotton seeds using n-hexane as a solvent (yield: $84.0 \pm 4.0\%$). We also obtained cotton seed and cotton boll extracts via Soxhlet extraction (25:75 hydroalcoholic ratio). These extracts, combined with cornstarch, formed four herbal medicinal formulations. Ethical approval allowed us to investigate their effects on Leishmania-caused skin wounds, comparing them to glucantime (local ampoule). Herbal formulas outperformed the control group (ethanol only) in wound treatment (p-value 0.05). The average wound diameter after two months did not significantly differ between plant extract ointments and topical glucantime. Notably, cotton boll extract with 1% extra gossypol crystal showed the best therapeutic effect. We extracted gossypol from cotton seeds using n-hexane via Soxhlet extraction. Saponification, acidification, and recrystallization steps followed. FTIR, UV-Vis, and HPLC analyses confirmed the product's identity. Herbal medicines from cotton seeds effectively treated chronic wounds compared to the ethanol-only control group. Wound diameter differed significantly between extract ointments and glucantime injections. It seems that due to the presence of large amounts of fat in the oil, the extraction of gossypol from it faces many obstacles. The extraction of this compound with our technique showed that extraction from oil has a higher efficiency, perhaps because of the preparation of oil by cold pressing method, the possibility of losing this compound is much less than when extraction is done with Soxhlet. On the other hand, the gossypol in the oil is mostly bound to the protein, which somehow protects the gossypol until the last stage of the extraction process. Since this compound is very sensitive to light and heat, it was extracted as a derivative with acetic acid. Also, in the treatment section, it was found that the ointment prepared with the extract is more effective and Gossypol is one of the effective ingredients in the treatment. Therefore, gossypol can be extracted from the oil and added to the extract from which gossypol has been extracted to make an effective medicine with a certain dose.

Keywords : cottonseed, glucantime, gossypol, leishmaniasis

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